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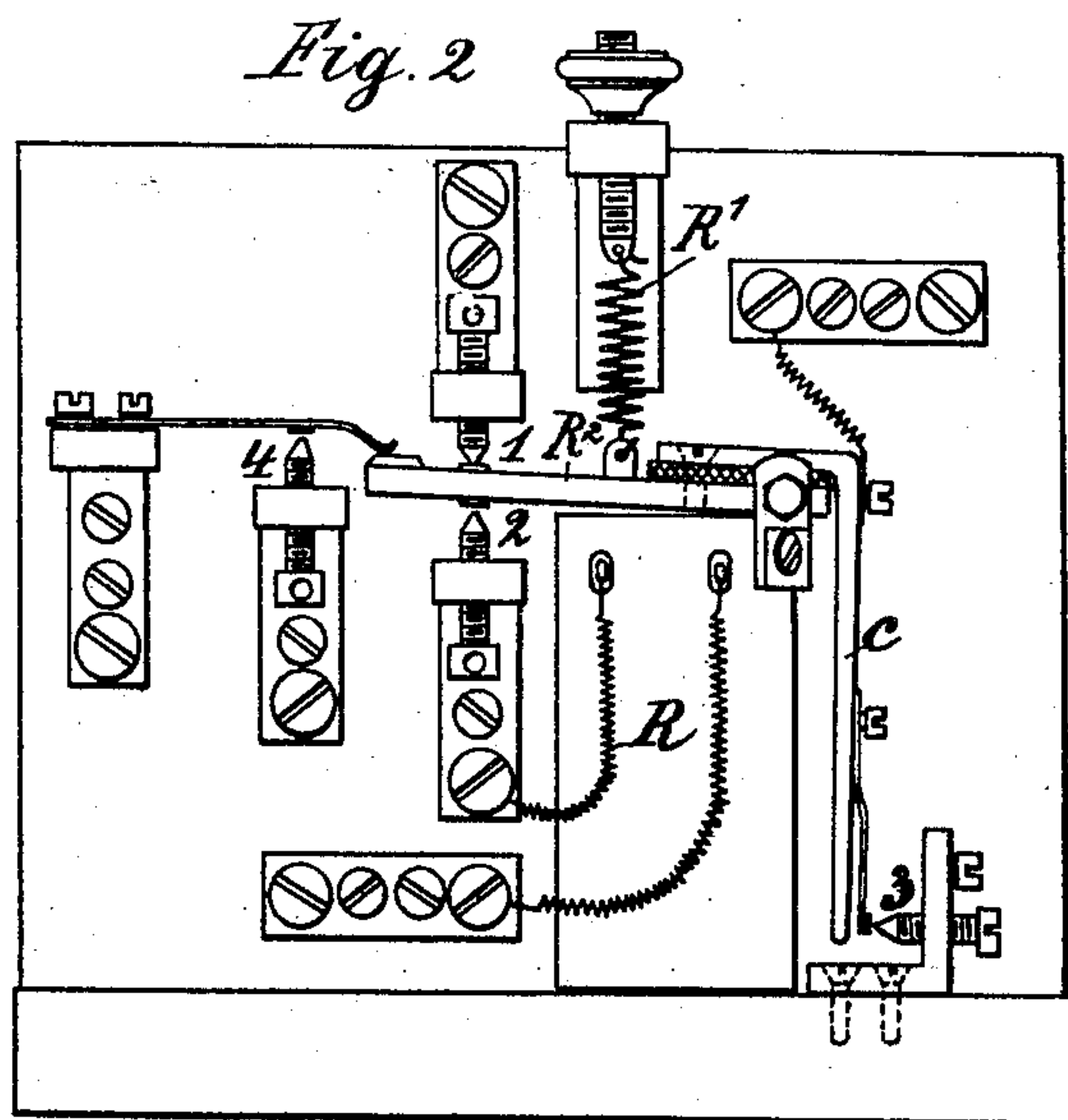
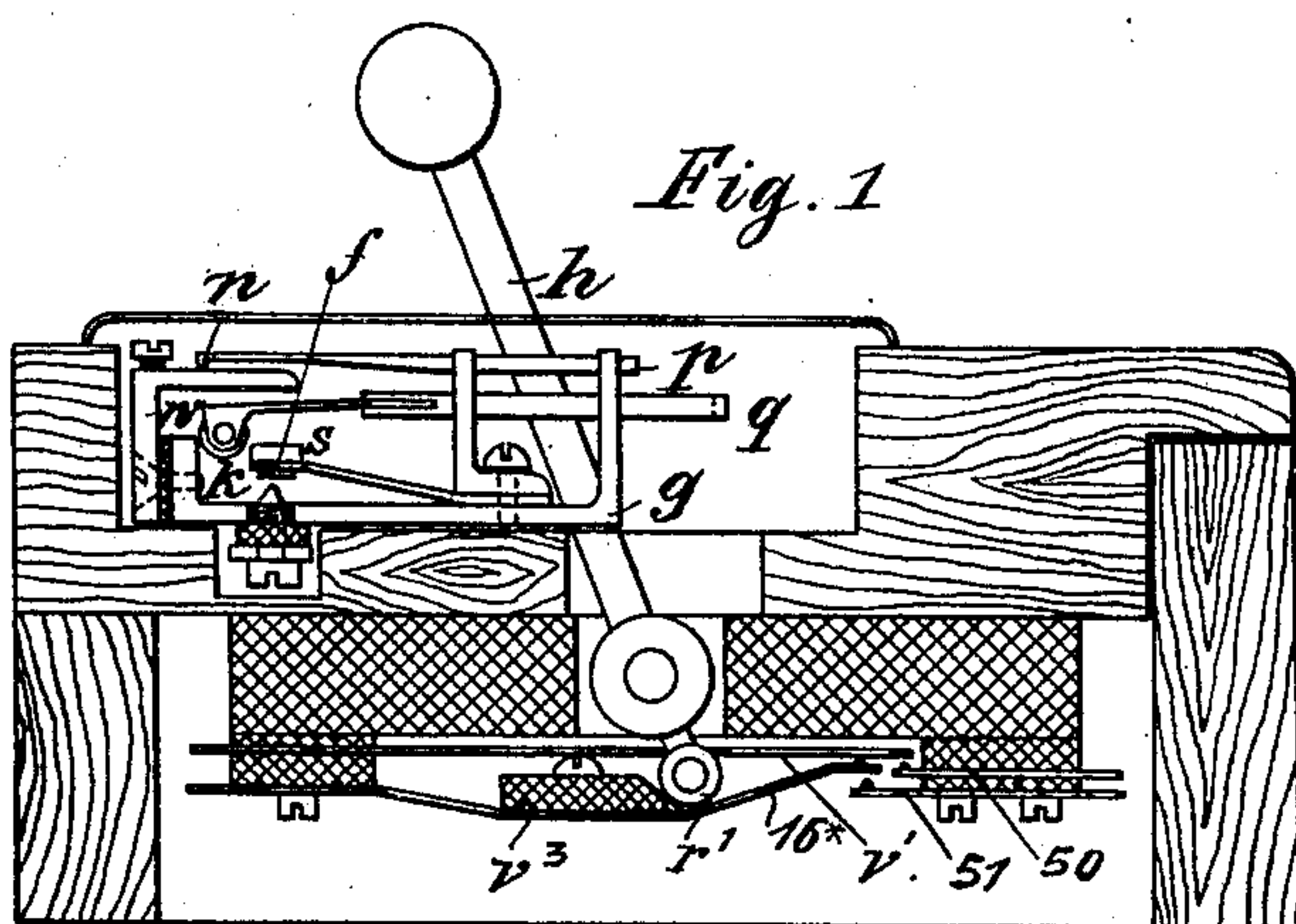
PATENTED MAR. 22, 1904.

J. H. MEYER.
COUNTING SYSTEM FOR TELEPHONES.

APPLICATION FILED MAY 28, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES

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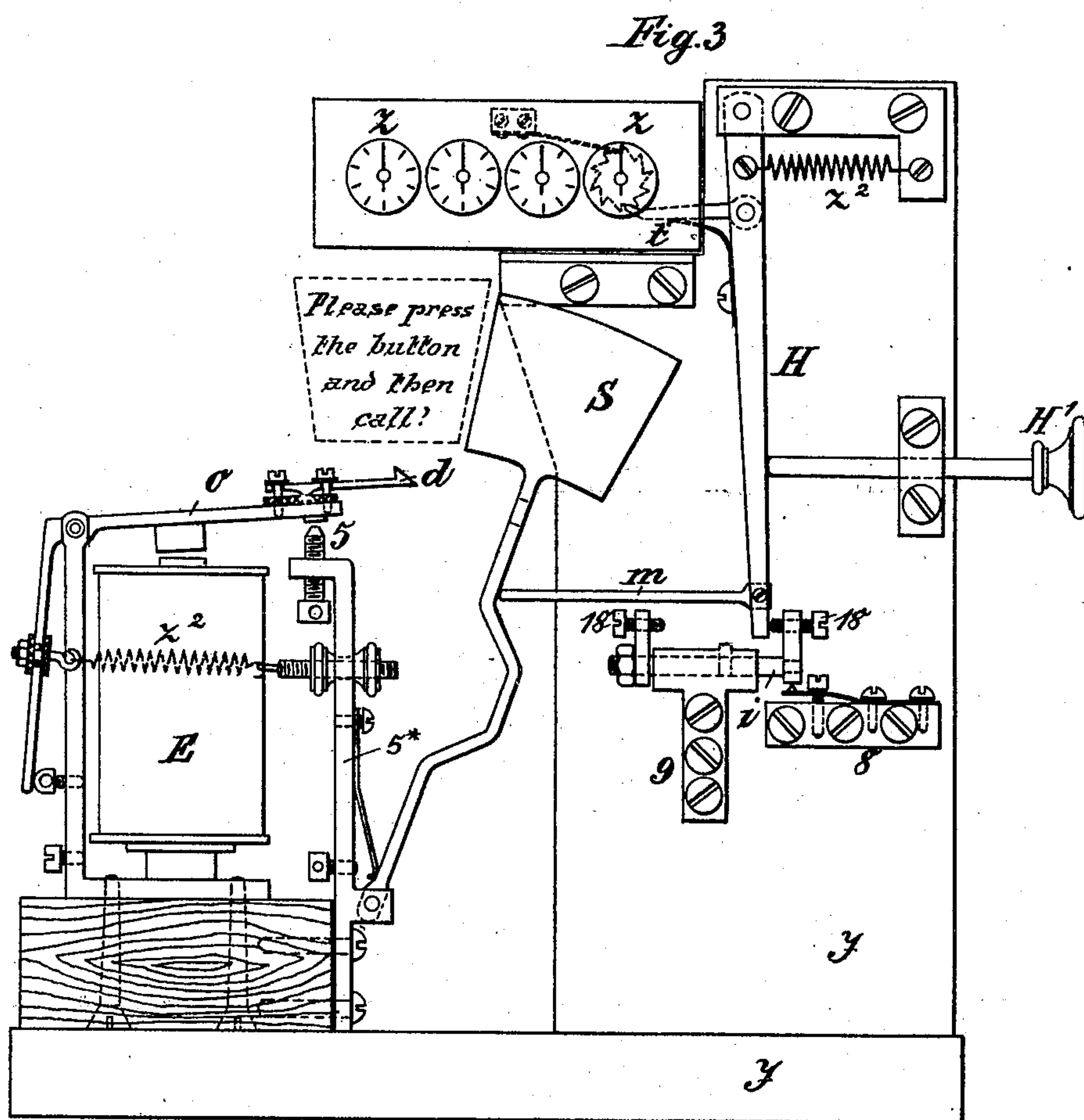
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J. H. MEYER.
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NO MODEL.

3 SHEETS—SHEET 2.



WITNESSES

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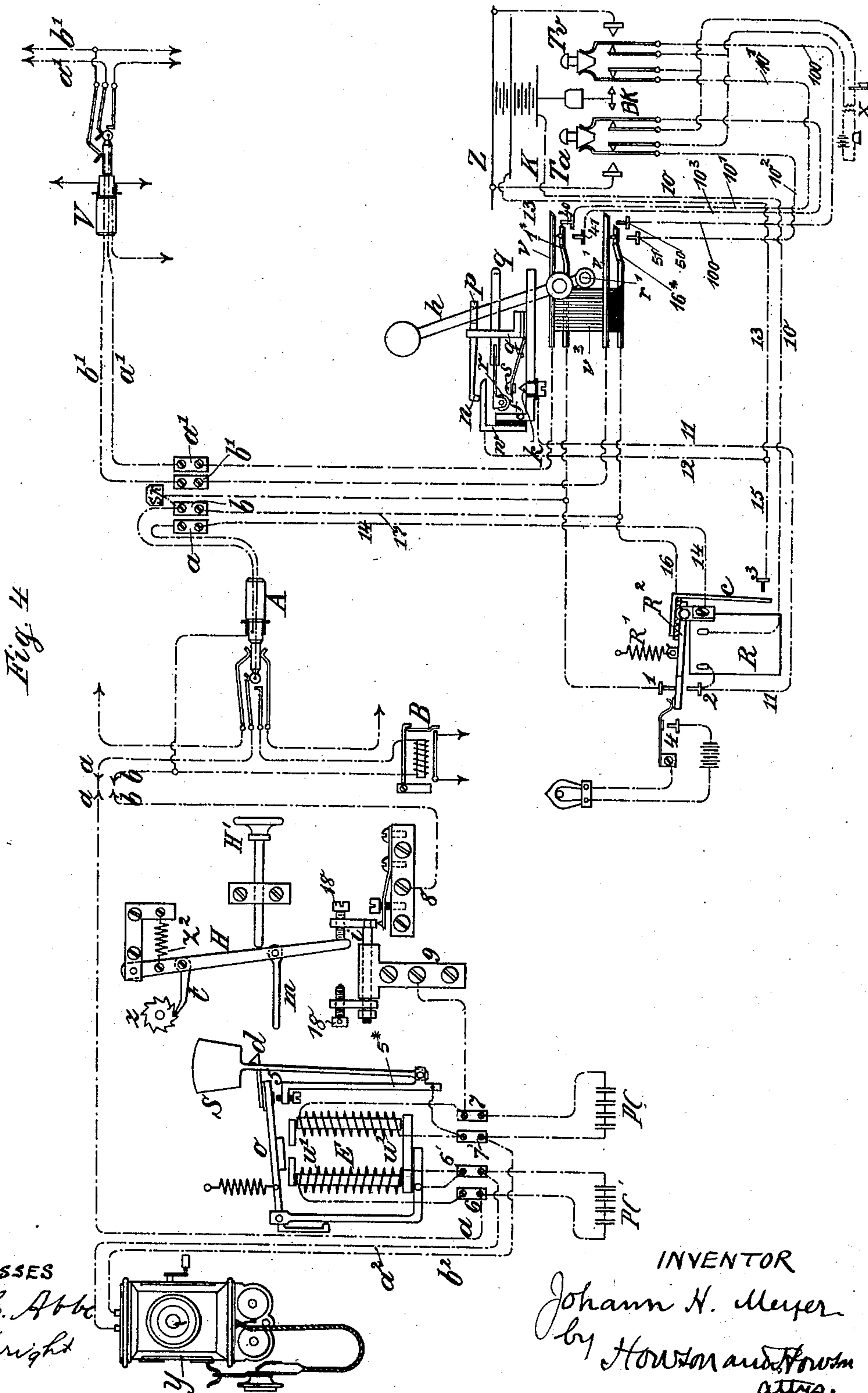
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

JOHANN HEINRICH MEYER, OF MAGDEBURG, GERMANY.

COUNTING SYSTEM FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 755,515, dated March 22, 1904.

Application filed May 26, 1902. Serial No. 108,962. (No model.)

To all whom it may concern:

Be it known that I, JOHANN HEINRICH MEYER, a subject of the Emperor of Germany, residing at Magdeburg, in the German Empire, have invented an Improved Counting System for Telephones, of which the following is a specification.

This invention has for its object to provide an improved counting and registering system for telephonic conversations or messages, one of as great simplicity as possible, and one that will not permit the calling subscriber to get the connection desired until he has actuated his counter. At the same time I so construct and regulate the system that once the operator has got the desired connection he may throw his central-office mechanism into such position that a current is sent to the calling-station, simultaneously breaking the called station's circuit. This current through suitable mechanism at the calling-station cuts out the calling telephonic instruments, and it is not until the calling subscriber has operated his counter that these are again switched in. When, however, these are switched in, the central-office mechanism is thereupon automatically operated, so that the current coming from central is cut out, the called line is cut into circuit with the calling subscriber, and conversation established.

To accomplish these desired results, I provide an ordinary train of counting-wheels, means for mechanically actuating the counter, and an electric switch actuated by said means to get connection with the exchange. I provide an electromagnetic switch and a set of telephonic instruments at each subscriber's station, while at the central station I provide a hand-switch having a number of peculiarly-disposed contact-points, a battery, a relay, and a plug for connection with the switchboard of the subscriber called, the corresponding wires of the plug being connected to certain switch-points. A set of telephonic instruments is also necessary at the exchange and suitable connections to them to permit the operator to talk to either subscriber at will. In the accompanying drawings I have illustrated my invention as supplied with a well-known form of two-cord switch-plug; but it will be

obvious that any other known system of switchboard or attachments may be readily fitted with my counter and counter-circuits.

In the accompanying drawings, Figure 1 is a sectional view of the central-station hand-switch. Fig. 2 is a side elevation of the relay. Fig. 3 is a side elevation of the counter mechanism and controlling electromagnetic switch at the subscriber's station, and Fig. 4 is a diagrammatic view of the calling-station and central station and the plug connections for the called station.

At the subscriber's station I provide an ordinary telephonic-instrument set Y, Fig. 4, having leading-in wires $a^2 b^2$. To a suitable frame y , Fig. 3, I secure the counting mechanism, Figs. 3 and 4, which consists of a lever H, pivoted at one end and carrying a pawl t , adapted to act on the ratchet z of the unit-wheel of a counting-train L. Secured to the lower end of this counter-arm is a projecting finger m . At the end of the arm H is a slide i , laterally movable in suitable fixed bearings 9 by the end of the lever H coming into contact with adjustable abutments 18 on the slide. A spring contact-plate 8 is arranged below the slide i to be in electrical contact with the slide when it is in the right-hand position, but adapted to have contact broken when moved to the left by the lever H, this lever being mechanically actuated by the subscriber pressing upon the push-button H'. The slide i and contact 8 constitute a circuit-interrupting switch, the contact-plate 8 being connected to line b , Fig. 4. An electromagnet E has two coils $u' u^2$ oppositely wound, one coil, u^2 , being electrically connected with connection-plates 7 and 7' and the other, u' , with 6 and 6'. Plate 7 is connected with the bearing 9, carrying the slide i , and so electrically connected to the latter, while plate 7' is connected to the leading-in wire b^2 and to an arm 5*, having a contact 5 at its upper end. Plate 6 is connected to the line a , while 6' is connected to the leading-in wire a^2 and also to the metal frame carrying the pivoted armature O, and so electrically connected to the latter. This armature has a hooked end d , adapted to catch and hold the signal-drop S when the armature is in its upper released position. A se-

ries of polarized cells P C P C' are placed one set in electrical connection with plates 7 7', the other with plates 6 6', and serve each as a bridge across the terminals of the coils $u^2 u'$.

5 When the parts are in the positions shown at left of Fig. 3 and direct current is sent into the calling-subscriber's station over the lines $a b$, the circuit is from wire b , contact 8, slide i , bearing 9, connection 7, (here it is opposed
10 by the cells,) over the coil u^2 , connection 7', through b^2 to the telephonic instruments, then through a^2 to 6', to coil u' , to plate 6, and so to line a . The armature O is thus attracted, contacting with point 5. This cuts out the
15 telephonic instruments, the circuit then being from 7 through coil u^2 to 7', to frame 5*, to 5, to armature O, to contact 6', to coil u' , to contact 6, and so to line a , these parts acting as a low-resistance shunt to cut out the
20 instruments. The hook d has at the same time released the signal-drop S, which moves over to the right and leaves a legend exposed for the subscriber, reading, "Please press the button and then call," for example, Fig. 3.
25 The subscriber then presses the button H', which by the arm m moves the drop S back to its original position, revolves the unit-number wheel one tooth, and then breaks the circuit at i . This causes release of the arma-
30 ture O, breaking circuit at 5, and accomplishes certain operations at the central office hereinafter described. On release of push-button H' the spring ε^2 draws the lever H back to its original and normal position and again es-
35 tablishes the circuit at i . The alternating current used in talking finds a ready path over the polarized cells P C P C', thereby doing away with self-induction, which might take place if but one path over the magnet-
40 coils were open for it.

B, Fig. 4, is a drop at central, ordinarily connected to the line $a b$, but disconnected after the insertion of the plug A in the exchange or central switchboard, as will be
45 readily understood.

At the exchange or central station I place a hand switch-lever h , Figs. 1 and 4. This lever operates two rods p and q , each having an opening through which the lever passes.
50 The opening in q is much longer than that in p , so that p is moved upon the first movement of h , but q is not moved until later. The rod p has a nose-piece n at one end adapted to bear on an angle contact-piece w , insulated
55 from the rest of the switch, while the rod q carries a roller r , adapted to come into contact with a spring part s , secured to the frame g and carrying a contact-plate f' directly over an insulated contact-stud k .

60 Below the described switch parts and mounted on insulated supports I secure two sets of long contact spring-fingers $16^* v'$ and $1^* v$. (Shown in side elevation, Fig. 1, and in perspective scheme in Fig. 4.) When the switch-
65 lever h is in the left-hand position shown,

these spring-fingers 16^* and v' and $v 1^*$ are in electrical contact with each other. An insulated cam-block v^3 is fastened across the spring-fingers 16^* and 1^* , and against this block a roller r' on the lower end of the lever
70 h is adapted to press when the lever is moved to the right, thereupon separating the contact-finger 16^* from v' and the finger 1^* from v . Near the free ends of these contact-fingers and also mounted in the insulated support
75 are contact-points 50 and 51, arranged below and opposite the fingers 16^* and v' . Below and opposite the fingers 1^* and v are contact-points 40 and 41. (Best indicated in schematic perspective in Fig. 4.) When the
80 upper arm of the lever h is thrown over to the right, the roller r' will press downward the insulation-plate v^3 , and with it the two spring-fingers 16^* and 1^* , thereby bringing
85 them into electrical connection with their contacts 51 and 41, respectively. At the same time the spring-fingers $v v'$ (which had previously been held up by the stronger springs 16^* and 1^* , Fig. 1) will be freed and will by
90 their natural elasticity descend into electrical connection with their respective contacts 50 and 40. A relay R, having an armature R' and front and back contacts 1 and 2, is also provided at the central station. This arma-
95 ture carries a contact-arm c , Fig. 2, insulated from the armature and adapted to contact with a point 3. A spring R' normally holds the armature against the back stop 1. A bat-
tery K, Fig. 4, having lead-wires 10 13, is also provided at the central station, wire 13
100 being connected to point 3 and to the angle-piece w , while 10 is connected directly to the relay-coils. One wire, 14, from the plug A is electrically connected to the armature of the relay through its pivot, while the other
105 wire, 17, is connected to the wire 16, which is in turn connected to the insulated contact-lever c and also to the hereinbefore-described spring switch-finger 16^* . The back contact 1 of the relay is connected to the spring
110 switch-finger 1^* , while the front contact 2 is connected to the relay magnet-coils and to the line 11 and contact-stud k .

The plug V used for the called subscriber has wires $b' a'$, the wire a' being connected to
115 the spring contact-finger v , while b' is connected with the spring contact-finger v' , Figs. 1 and 4.

When the hand-lever h is in its left-hand position, (shown in Figs. 1 and 4,) point v con-
120 tacts with 1^* and v' with 16^* . When the switch-lever h is thrown to the right, the spring-fingers v and 1^* contact with points 40 41, while the spring-fingers $v' 16^*$ contact with points 50 51. Each such set of points is
125 connected in any suitable manner with the central attendant's telephone at X, so as to permit him to bridge over and talk to either the called subscriber or the calling subscriber.

On pushing down the wedge of switch T
130

the operator can send a current from battery Z over 100, to 50, to v' , to b' , to called subscriber to ring his bell, returning over wire a' , contacts v and 40, and wire 101 to battery Z through BK. In like manner a switch Ta may be used to send current from battery Z over line 102, contacts 51 16* to line 17 of calling subscriber, returning over line 14, armature R², line 1, contact 1*, and point 41 and line 103 to battery connection BK. It is obvious that if current may at will be switched to either of these subscribers the operator may readily talk from X with either subscriber over the circuits before described, when the wedges of switches Ta and Tv are raised, as shown in Fig. 4.

In operation the calling subscriber causes the drop B in the central office to fall, as heretofore explained, whereupon the operator inserts plug A and moves the switch-lever h to the right, Figs. 1 and 4, and the relay-armature R² being in its raised position the operator talks over 14, R², 1, 1*, 41, 103, X, 102, 51, 16*, and 17. The operator then inserts the plug V for the called subscriber and may talk to him over a' , v , 40, 101, X, 100, v' , and b' . If all is in readiness for connection, the operator throws the switch h to the left, Figs. 1 and 4, the nose n contacting at first with the angle-piece w , Fig. 1. Then the roller r presses f down on the contact-stud k . This momentarily sends a current from battery Z over 13, 12, w , n , frame g , f , and k to line 11, to stop 2, to relay R, to line 10, to battery at K. The armature R² is attracted and remains attracted, as its attraction establishes a circuit from Z over 13, 3, arm c , and wires 16 17 to subscriber and back from subscriber by wire 14, armature R², stop 2, relay, line 10 to battery at K. The called subscriber is not now in circuit, his circuit from a' to v and 1* being broken at 1. Upon this battery-current being sent to the calling-station the subscriber is advised to push the button H', which he does, breaking the circuit at i , with the results at the calling-station hereinbefore described and the additional result at central of allowing the armature R² to rise. This breaks the battery connection at 3 and also cuts out the operator. When the circuit at i is again established, the following circuit from the calling instruments and the plug A is established: line 14, armature R², contact 1, contact 1*, contact v , line a' to plug V and called subscriber, back over b' , contact v' , contact 16*, and line 17 to plug A, and circuit is established between A and V. A lamp and contact 4, Fig. 1, may be connected with the armature R² to indicate to the operator when connection has been made. Instead of the polarized cells it is obvious that any other well-known induction-free artificial resistance may be used, the polarized cells being shown merely as one practical method of carrying out this part of the invention.

It is obvious that my drop S for advising the calling subscriber to push the button is but one well-known form of indicating means common to telephony, and any other suitable indicating means may be used, such as a galvanoscope.

An indicator SK may be bridged across the lines from b to 1*, v to line a' as a means of notifying the operator when the subscribers have ceased conversing.

I claim as my invention—

1. The combination with a telephone-line and the telephones at the substation thereof, a service-meter or toll-charging device at the substation, and means for manually operating said meter, mechanism adapted to render the telephonic apparatus inoperative, and a magnet controlling said mechanism, an answering-plug for making connection with the line at the central office, and a source of current connected therewith adapted to excite the magnet to prevent the use of the telephone when a call is answered, and a device operated manually in the actuation of the meter for rendering said telephone operative, manually-actuated mechanism at the central station adapted to connect called and calling stations, and means to cause a break in one point of said circuit in the line, an automatic relay at the central station to control said break and connections between it and said manually-operated mechanism at the central office to cause it to be energized on the movement of the mechanism, and connections between the relay, mechanism and line, to cause said relay to be deenergized upon the movement of said magnet-controlling mechanism at the calling-station and thus establish the circuit at the aforesaid break, as set forth.

2. In combination with a telephone-line, means for calling the central office from the station thereof, and telephone apparatus at the station, of a device at the substation adapted to render an essential part of said telephone apparatus inoperative, and a magnet controlling said device, an answering and a calling plug for making connection with the line at the central office, a source of current applied through the answering-plug adapted to operate said magnet, an independent manually-operated device at the substation adapted to render the telephone apparatus operative, and a service-meter or toll-collecting appliance operated by said device, manually-actuated mechanism at the central station adapted to connect called and calling stations and means to cause a break in one point of said circuit in the line, an automatic relay at the central station to control said break and connections between it and said mechanism to cause it to be energized on the movement of the mechanism and connections between the relay, mechanism and line, to cause said relay to be deenergized upon the movement

of said magnet-controlling mechanism at the calling-station and thus establish the circuit at the aforesaid break, as set forth.

3. The combination with a telephone-line
5 extending from a substation to a central office, of a magnet connected with the line at the substation, and mechanism controlled by said magnet for rendering inoperative the telephone apparatus at the substation, whereby
10 the use of such telephone apparatus may be prevented, a source of current at the central office adapted to energize said magnet, to actuate said mechanism, means for connecting said source of current with the line, a toll device at the substation, and a releasing appliance actuated in the operation of said toll-counter, for restoring the operative condition of the substation telephone apparatus, manually-operated mechanism at the central station
20 adapted to connect called and calling stations and means to cause a break in one point of said circuit in the line, an automatic relay at the central station to control said break and connections between it and said manually-operated mechanism at the central office to cause it to be energized on the movement of the mechanism, and connections between the relay, mechanism and line, to cause said relay to be deenergized upon the movement of said
30 magnet-controlling mechanism at the calling-station and thus establish the circuit at the aforesaid break, as set forth.

4. A telephone counting system for telephone subscribers, consisting of instruments
35 Y, an electromagnetic switch adapted to be operated by direct current, and when so operated to cut out the instruments Y, a circuit-interrupter and a counting mechanism, in combination with a central station having a manually-operated switch and an automatic relay,
40 connections and contacts for the switch and relay so disposed that when the called and calling subscribers have been connected, before the counter has been operated, and upon the operation of the switch, that a break will occur in the circuit at the relay and upon operating the said circuit-breaker this broken circuit will be automatically connected at the relay, as and for the purpose described.

50 5. A telephone counting system comprising instruments Y, and line-wires, an electromagnetic switch, comprising two coils, one connected to one line-wire and to the instruments, the other connected to the other line-wire and
55 also to the instruments, an armature and a shunt cut-out operated thereby, to cut out said instruments from the circuit, a circuit-interrupter and a counting mechanism, in combination with a central station having a manually-operated switch and an automatic relay,
60 connections and contacts for the switch and relay so disposed that when the called and calling subscribers have been connected, and before the counter has been operated, that
65 upon the operation of the switch a break will

occur in the circuit at the relay, and upon operating the said circuit-breaker this broken circuit will be automatically connected at the relay, as and for the purpose described.

6. A telephone counting system comprising
70 a counter, an electromagnetic switch having terminals and a non-inductive resistance-bridge, a circuit-breaker, line-wires connected to the terminals, and to a set of instruments Y, in combination with a central station having
75 a manually-operated switch and an automatic relay, connections and contacts for the switch and relay so disposed that when the called and calling subscribers have been connected and before the counter has been operated
80 that upon the operation of the switch a break will occur in the circuit at the relay and upon operating the said circuit-breaker this broken circuit will be automatically connected at the relay, as and for the purpose described. 85

7. A telephone counting system comprising a counter, an electromagnetic switch having coils, polarized cells bridging the coil-terminals, a set of instruments, connections from the switch-terminals to the central station, a
90 manually-operated switch, an automatic relay at the central station, and means for causing a break in the otherwise completed circuit from calling to called subscriber at the relay before the operation of the counter, as and
95 for the purpose set forth.

8. A telephone counting system, comprising an electromagnetic switch having two oppositely-wound coils and a pair of terminals for each coil, a non-inductive bridge resistance
100 for each pair of terminals, a telephonic-instrument set and a counter mechanism, connections from the switch-terminals to the central station, a manually-operated switch, an automatic relay at the central station and a
105 means for causing a break in the otherwise completed circuit from calling to called subscriber at the relay before the operation of the counter, as and for the purpose set forth.

9. A counting system for telephones, comprising a counter, an electromagnetic switch having a non-inductive bridge resistance across its terminals, a signaling device operated by said switch, instruments Y and a line, the set of telephonic instruments adapted to
110 be in circuit with the magnetic switch when no direct current is passing, the non-inductive bridge resistance then offering the alternating currents a passage through the counting device, and mechanism operated by the switch
120 upon the passage of the direct current to cut out the instruments, connections from the switch-terminals to the central station, a manually-operated switch, an automatic relay at the central station, and a means for causing a
125 break in the otherwise completed circuit from calling to called subscriber at the relay before the operation of the counter, as and for the purpose set forth.

10. A telephone counting system compris- 130

ing a counter, an electromagnetic switch having an armature, two coils, and contact-point 5, in combination with a set of instruments Y, line-wires, a connection from a different side of the line to each coil and from each coil to the instruments, a connection from one coil to the contact 5, and from the other to the armature, and connections from the switch terminals to the central station, a manually-operated switch, an automatic relay at the central station and a means for causing a break in the otherwise completed circuit from calling to called subscriber at the relay before the operation of the counter, as and for the purpose set forth.

11. A telephone-counter, comprising a train of counting-wheels, a pivoted operating-lever, a pawl on the lever, a current-interrupter in circuit with the line and a signaling device, said lever on its movement to count, being adapted to break the circuit at the interrupter and to mechanically move the signaling device, and further adapted to prevent the re-establishment of the circuit until in position to again count, substantially as described.

12. A telephone-counter, comprising counting mechanism and means to manually actuate said mechanism, and a current-interrupter comprising a conductive sliding piece in circuit with the line, said means on its movement to count, being adapted to break the circuit at the interrupter by moving the sliding piece and adapted to prevent the reestablishment of the circuit until in position to count again, substantially as described.

13. A telephone counting system, comprising instruments, a counter, a pivoted operating-lever, a pawl on the lever, and a current-interrupter in the subscriber's circuit to be operated by the lever, in combination with a magnetically-released signal-drop, said lever on being moved to count being adapted to lift the drop, and also break the subscriber's circuit and to reestablish said circuit and leave the drop raised upon moving into position prior to again counting, substantially as described.

14. A telephone-counter, comprising a train of counting-wheels, a pivoted operating-lever, a pawl on the lever and a normally closed circuit-interrupter to be opened by the lever, in combination with a set of instruments Y, an electromagnetic switch adapted to cut out said instruments upon a passage of direct current, and to be so released upon the operation of the counter and the opening of the circuit-interrupter as to cut in the instruments, as and for the purpose set forth.

15. A calling-station having instruments, and an instrument-controlling switch, a circuit-interrupter and counter, in combination with a central station, having a relay, an armature therefor, a hand-switch adapted to cut in and out operator's telephone, and a plug for the called subscriber and one for the call-

ing subscriber, a battery, said hand-switch having contacts, connections to said contacts adapted in one position of the switch to momentarily send a current from the battery through the relay, to attract its armature, thereby breaking at the relay the circuit to the plug of the called subscriber, and to connect the poles of the battery to both branches of the line to the calling subscriber, and suitable contact-points for the relay, at which points, the means for interrupting the circuit at the calling-station is adapted, by releasing said relay-armature, to cut out the central battery and establish the circuit from the calling to the called station, substantially as described.

16. A telephone counting system, comprising a hand-switch, contacts and connections therefor, a relay for a central station, said relay having an armature with front and back contact-points, a contacting arm carried by the armature and a point 3 therefor, in combination with a plug V connected on one side to the contacting arm through said switch connections and on the other to the front point, also through said switch connections, a battery connected, one pole to the relay, and one pole to the point 3, a momentarily-operated contact-point k connected to the said front contact-point 2 and an insulated contact w connected to the battery, a frame adapted to momentarily connect the contact w and the point k and a calling-station having an instrument, an instrument-controlling switch, a counter and a circuit-interrupter, as and for the purpose set forth.

17. In combination with a calling-station having instruments, a counter, an instrument-controlling switch, a circuit-interrupter, a central station having a relay, a battery, a hand-switch comprising two rods with openings of unequal length, a lever passing through said openings, a contact w and a contact-point k both in the frame and insulated, means carried by the rod having the greater opening to contact between the frame and contact k , and means carried by the other rod to contact with the contact w , and connections between the relay, battery and points k and w , as and for the purpose described.

18. A hand-switch having two rods p, q , two contacts w, k , two contacts v, v' , and a plug and wires connected to the last-named contacts, in combination with contacts $l^*, 16^*$, a relay, an armature therefor, front and back contact-points 1 and 2, the back contact being connected to contact l^* , a contacting arm connected to contact 16^* , a contact 3, a battery connected to contact 3, and to contact w on one side, and to the relay and front contact 2 on the other side, and a connection from contact 2 to contact k , in combination with a calling-station having instruments, instrument-controlling switch, a circuit-interrupter and counter, substantially as described.

19. A telephone-counter system, having

an electromagnetic instrument-controlling switch, a counter and a set of telephonic instruments at the calling-station, a switch and relay at central station, connections therefrom
5 to the calling-station, a plug V at the central station, said switch having contact means and connections adapted, upon the operation of the switch, to send a current to the calling-station to signal the calling subscriber that the
10 desired subscriber is connected, and means to send a current through the relay, thereby cutting off the calling subscriber by operating the instrument-switch, thereby cutting out said

instruments, and means connected with the counter to automatically switch in said instru- 15
ments, connect the subscribers and deenergize the relay, after registering the message, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two sub- 20
scribing witnesses.

JOHANN HEINRICH MEYER.

Witnesses:

L. PALMER,
O. RÖHLER.